

CLAIMS

That which is claimed is:

1. A balloon catheter having a balloon and a catheter body
formed of dissimilar polymeric materials, said balloon catheter
5 comprising:

a catheter body including an outer tubular member having
proximal and distal ends and a lumen extending therethrough,
said outer tubular member formed from a first polymeric
material;

10 said catheter body further including an inner tubular
member having proximal and distal ends and a lumen extending
therethrough, said inner tubular member being coaxial with said
outer tubular member, said inner tubular member running
longitudinally through said outer tubular member and extending
15 distally beyond the distal end of said outer tubular member,
said inner tubular member formed from said first polymeric
material;

an inflatable balloon having a main body portion and
proximal and distal portions extending from said main body
20 portion, said proximal and distal portions each having an inner
and outer surface, said inflatable balloon formed from a second
polymeric material different from said first polymeric material;

a first layer of adhesive material interposed between said
inner surface of the proximal portion of the balloon and said

distal end of the outer tubular member to bond said inner surface of the proximal portion of the balloon to said distal end of the outer tubular member;

5 a first retaining ring positioned over and crimped tightly around said proximal portion of the balloon to reinforce the bond formed with said first layer of adhesive material and said distal end of the outer tubular member;

10 a second layer of adhesive material interposed between said inner surface of the distal portion of the balloon and said distal end of the inner tubular member to bond said inner surface of the distal portion of the balloon to said distal end of the inner tubular member;

15 a second retaining ring positioned over and crimped tightly around said distal portion of the balloon to reinforce the bond formed with the second layer of adhesive material and said distal end of the inner tubular member; and,

20 a coupling member having a lumen extending therethrough, said coupling member being mounted on the proximal end of the outer tubular member and the lumen of the coupling member communicating with the lumen between the outer tubular member and the inner tubular member so that fluid may be injected into the lumen of the coupling member to inflate the balloon.

2. A balloon catheter as described in Claim 1, wherein the first polymeric material is formed of polyurethane and the second polymeric material is formed of silicone.
- 5 3. A balloon catheter as described in Claim 1, wherein the first polymeric material is formed of polyurethane, the second polymeric material is formed of silicone, and the first and second layers of adhesive materials are formed of silicone.
- 10 4. A balloon catheter as defined in Claim 1, further comprising a proximal retaining ring sleeve, said proximal retaining ring sleeve overlapping the proximal end of said first retaining ring by at least half of the length of said first retaining ring, said proximal retaining ring sleeve being heat fused to said outer tubular member and said first retaining ring thereby preventing said first retaining ring from moving along the length of said outer tubular member.
- 15 5. A balloon catheter as defined in Claim 4, further comprising a distal retaining ring sleeve, said distal retaining ring sleeve positioned distally adjacent to the second retaining ring, said distal retaining ring sleeve being heat fused to said inner tubular member thereby preventing said second retaining ring from moving along the length of said inner tubular member.
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6. A balloon catheter as defined in Claim 5, wherein the first
polymeric material is formed of polyurethane, the second
polymeric material is formed of silicone, the first and second
5 layers of adhesive materials are formed of silicone, the
proximal retaining ring sleeve is formed of nylon, and the
distal retaining ring sleeve is formed of polyurethane.

7. A balloon catheter as defined in Claim 5, wherein the first
10 and second retaining rings are formed of a radiopaque material
and serve as radiopaque marker bands for positioning the
proximal and distal ends of the balloon, respectively.

8. A balloon catheter as defined in Claim 7, wherein the first
15 polymeric material is formed of polyurethane, the second
polymeric material is formed of silicone, the first and second
layers of adhesive materials are formed of silicone, the
proximal retaining ring sleeve is formed of nylon, the distal
retaining ring sleeve is formed of polyurethane, and the
20 radiopaque material is formed of gold.

9. A balloon catheter comprising:

an outer tubular member having proximal and distal ends and
a lumen extending therethrough;

an inner tubular member having proximal and distal ends and a lumen extending therethrough, said inner tubular member being coaxial with said outer tubular member, said inner tubular member running longitudinally through said outer tubular member and extending distally beyond the distal end of said outer tubular member;

an inflatable balloon having a main body portion and proximal and distal portions extending from said main body portion, said proximal and distal portions each having an inner and outer surface;

a first layer of adhesive material interposed between said inner surface of the proximal portion of the balloon and said distal end of the outer tubular member to bond said inner surface of the proximal portion of the balloon to said distal end of the outer tubular member;

a first retaining ring positioned over and crimped tightly around said proximal portion of the balloon to reinforce the bond formed with said first layer of adhesive material and said distal end of the outer tubular member;

a second layer of adhesive material interposed between said inner surface of the distal portion of the balloon and said distal end of the inner tubular member to bond said inner surface of the distal portion of the balloon to said distal end of the inner tubular member;

a second retaining ring positioned over and crimped tightly around said distal portion of the balloon to reinforce the bond formed with the second layer of adhesive material and said distal end of the inner tubular member; and,

5 a coupling member having a lumen extending therethrough, said coupling member being mounted on the proximal end of the outer tubular member and the lumen of the coupling member communicating with the lumen between the outer tubular member and the inner tubular member so that fluid may be injected into
10 the lumen of the coupling member to inflate the balloon.

10. A balloon catheter as defined in Claim 9, wherein the inner and outer tubular members are formed of polyurethane and the inflatable balloon is formed of silicone.

15 11. A balloon catheter as defined in Claim 9, wherein the inner and outer tubular members are formed of polyurethane, the inflatable balloon is formed of silicone, and the first and second layers of adhesive materials are formed of silicone.

20 12. A balloon catheter as defined in Claim 9, further comprising a proximal retaining ring sleeve, said proximal retaining ring sleeve overlapping the proximal end of said first retaining ring by at least half of the length of said first

retaining ring, said proximal retaining ring sleeve being heat fused to said outer tubular member and said first retaining ring thereby preventing said first retaining ring from moving along the length of said outer tubular member.

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13. A balloon catheter as defined in Claim 12, further comprising a distal retaining ring sleeve, said distal retaining ring sleeve positioned distally adjacent to the second retaining ring, said distal retaining ring sleeve being heat fused to said
10 inner tubular member thereby preventing said second retaining ring from moving along the length of said inner tubular member.

14. A balloon catheter as defined in Claim 13, wherein the inner and outer tubular members are formed of polyurethane, the
15 inflatable balloon is formed of silicone, the first and second layers of adhesive material are formed of silicone, the proximal retaining ring sleeve is formed of nylon, and the distal retaining ring sleeve is formed of polyurethane.

20 15. A balloon catheter as defined in Claim 13, wherein the first and second retaining rings are formed of a radiopaque material and serve as radiopaque marker bands for positioning the proximal and distal ends of the balloon, respectively.

16. A balloon catheter as defined in Claim 15, wherein the inner and outer tubular members are formed of polyurethane, the inflatable balloon is formed of silicone, the first and second layers of adhesive material are formed of silicone, the proximal retaining ring sleeve is formed of nylon, the distal retaining ring sleeve is formed of nylon, and the radiopaque material is formed of gold.

17. A method of manufacturing a balloon catheter which includes an outer tubular member having proximal and distal ends; an inner tubular member having proximal and distal ends, said inner tubular member being coaxial with said outer tubular member, said inner tubular member running longitudinally through said outer tubular member and extending distally beyond the distal end of said outer tubular member; an inflatable balloon having a main body portion and proximal and distal portions extending from said main body portion, said proximal and distal portions each having an inner and outer surface; wherein the method includes the steps of:

20 applying a first layer of adhesive material to the distal end of the outer tubular member;

 inserting the proximal portion of the balloon over the section of the outer tubular member covered by the first layer

of adhesive material such that the balloon and the outer tubular member are coaxially oriented;

positioning a first retaining ring over the proximal portion of the balloon;

5 crimping a first retaining ring onto the proximal portion of the balloon;

inserting the inner tubular member inside the balloon;

positioning a second retaining ring over the balloon;

applying a second layer of adhesive material onto the
10 distal end of the inner tubular member at a location beneath the distal portion of the balloon; and,

crimping the second retaining ring onto the distal portion of the balloon.

15 18. A balloon catheter as described in Claim 17, wherein at least a portion of the distal end of the outer tubular member is tapered prior to applying the first layer of adhesive material over the portion of the distal end which is tapered.

20 19. A method of manufacturing a balloon catheter which includes an outer tubular member having proximal and distal ends; an inner tubular member having proximal and distal ends, said inner tubular member being coaxial with said outer tubular member, said inner tubular member running longitudinally through said

outer tubular member and extending distally beyond the distal end of said outer tubular member; an inflatable balloon having a main body portion and proximal and distal portions extending from said main body portion, said proximal and distal portions

5 each having an inner and outer surface; wherein the method includes the steps of:

applying a first layer of adhesive material to the distal end of the outer tubular member;

10 inserting the proximal portion of the balloon over a portion of the outer tubular member covered by the first layer of adhesive material such that the balloon and outer tubular member are coaxially oriented;

positioning a first retaining ring over the proximal portion of the balloon;

15 crimping the first retaining ring onto the proximal portion of the balloon;

positioning a proximal retaining ring sleeve over at least a half of the first retaining ring and extending over a proximal portion of the first retaining ring;

20 heat fusing the proximal retaining ring sleeve to the outer tubular member and the first retaining ring;

inserting the inner tubular member inside the balloon;

positioning a second retaining ring over the balloon;

applying a second layer of adhesive material onto the distal end of the inner tubular member at a location beneath the distal portion of the balloon;

5 crimping the second retaining ring onto the distal portion of the balloon;

positioning a distal retaining ring sleeve distally adjacent to the second retaining ring; and,

heat fusing the distal retaining ring sleeve to the inner tubular member.

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20. A balloon catheter as described in Claim 19, wherein at least a portion of the distal end of the outer tubular member is tapered prior to applying the first layer of adhesive material over the portion of the distal end which is tapered.